SONOBUOY WIDE-ANGLE SEISMIC VELOCITY ACQUISITION PROGRAM

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Objectives

The sonobuoy program comprised two parts:

1. Velocity measurements for ODP site survey in Nauru Basin, in particular to investigate whether the acoustic basement reflector represents oceanic basement or sills/flows overlying sediments and "real" oceanic basement. The program was operated by the University of North Carolina-University of Rhode Island group.
2. Velocity measurements on the Ontong Java Plateau and its adjacent Nauru Basin to:
   - determine the velocity structure in the sediments and upper crystalline crust,
   - provide interval velocties for processing of the MCS lines.

   The program was operated by the University of Texas-University of Oslo group.

Five commercial sonobuoys provided by University of North Carolina – Wilmington were available for the Nauru Basin survey (#1-5, Fig. 1, Table 1), and 40 sonobuoys provided by University of Oslo for the Greater Ontong Java Plateau survey (#6-43, Fig. 1, Table 1).

Technical specifications

The University of North Carolina sonobuoys were type AN/SSQ-57A produced by Sparton Electronics, and the University of Oslo military surplus sonobuoys included 38, AN/SSQ-57A and 2 AN/SSQ-41,41A. The sonobuoys operate in the 160-172 MHz frequency range.

The sonobuoy receiving system, provided by University of North Carolina, included a custom-built 2 m dual Yagi antenna mounted at the ships aft mast about 23 m above sea level, and an ICOM-R8500 communications receiver. The signals were fed to the receiver via a 55 m long LMR-400 coaxial cable. The system was installed and tested during the port stay in Cairns.

The radio recorder output was connected to UTIG's Ithaco 481 amplifier operated at 0, -6, -12 dB, and its output was was recorded on the OYO digital recording system's auxiliary channel. The direct wave overdrove the auxiliary channel input at 0 and –6 dB causing coherent noise on all seismic channels.

The analog signal was displayed using a UTIG system. The signal from the amplifier was routed through another 481 amplifier and a Rockland bandpass filter for display on an EPC graphics recorder. Typically, 52dB gain was required. The filter was always set to 100 Hz, 6dB/octave low pass only.

Operation

Of the five commercial sonobuoys, one sank and two got tangled in the streamer and magnetometer cable. The military ones, all of 1984 and older vintage, indeed proved very reliable. Only two did not function properly: one did not surface, and another floated but had no carrier signal. In addition, three buoys were used for testing purposes. Thus, a total of 35 sonobuoy profiles were recorded (Table 1)

SB#2 was recorded along the 24-channel MCS line 200. All other sonobuoy profiles were recorded along the 48-channel MCS lines, while profiling at 5-7 knots over the sea floor. Shot intervals were 20 s., record length 16 s., and sampling interval 2 ms. The signal source varied from one to three 17 and 20 l airguns, operating at ±1600 psi.

Few profiles were affected by major sea floor and/or sub-sea floor topography, and the arrivals of the direct wave through the water document that the vessel maintained a remarkably constant speed with respect to the sonobuoy. On the other hand, westward moving surface currents reaching up to 2.5 knots, show that the assumption of a fixed sonobuoy position relative to the sea floor does not apply.

Profile locations (Fig. 1, Table 1)
MCS line 200
One profile, SB#2, in the Nauru Basin.
Nauru Basin-Ontong Java Plateau Transect (MCS line 400, including a 210-km-long E-W OBS line)
Approximately evenly spaced profiles, SB#5-30, from the Nauru Basin to the OBS line. In addition, one profile SB#31, in the center of the OBS line; and one profile, SB#32, west of OBS 10.
Line 500 (a 210-km-long N-S OBS line)
One profile, SB#35, south of OBS 9; another profile, SB#36, in the center; and two profiles, SB#37-38, north of OBS 1.
Line 600 (DSDP Site 289-Transect tie line)
Five profiles, SB#39-43.

Preliminary results
All profiles have recorded well-defined reflection hyperbolas from intra-sedimentary layers and top acoustic basement, thus providing input for reliable determination of interval velocities within the sedimentary column.

The quality of refracted arrivals improves considerably westward along the Nauru Basin-Ontong Java Plateau Transect. In the Nauru Basin few and relatively poorly defined refractors are observed in the analog records, although shipboard playback of the digital data showed the potential for considerable improvement by digital processing.

The profiles on the Ontong Java Plateau summit and flanks commonly show a series of refracted arrivals. In particular, the profiles on the main plateau reveal a consistent pattern of P-wave refractors, including:
- arrivals from deeper, high-velocity, sedimentary layers.
- strong arrivals from top acoustic basement, and in some profiles converted S-waves.
- weak but, in many profiles persistent, sub-basement arrivals.
- indications of pre-critical, sub-acoustic basement reflection hyperbolas.

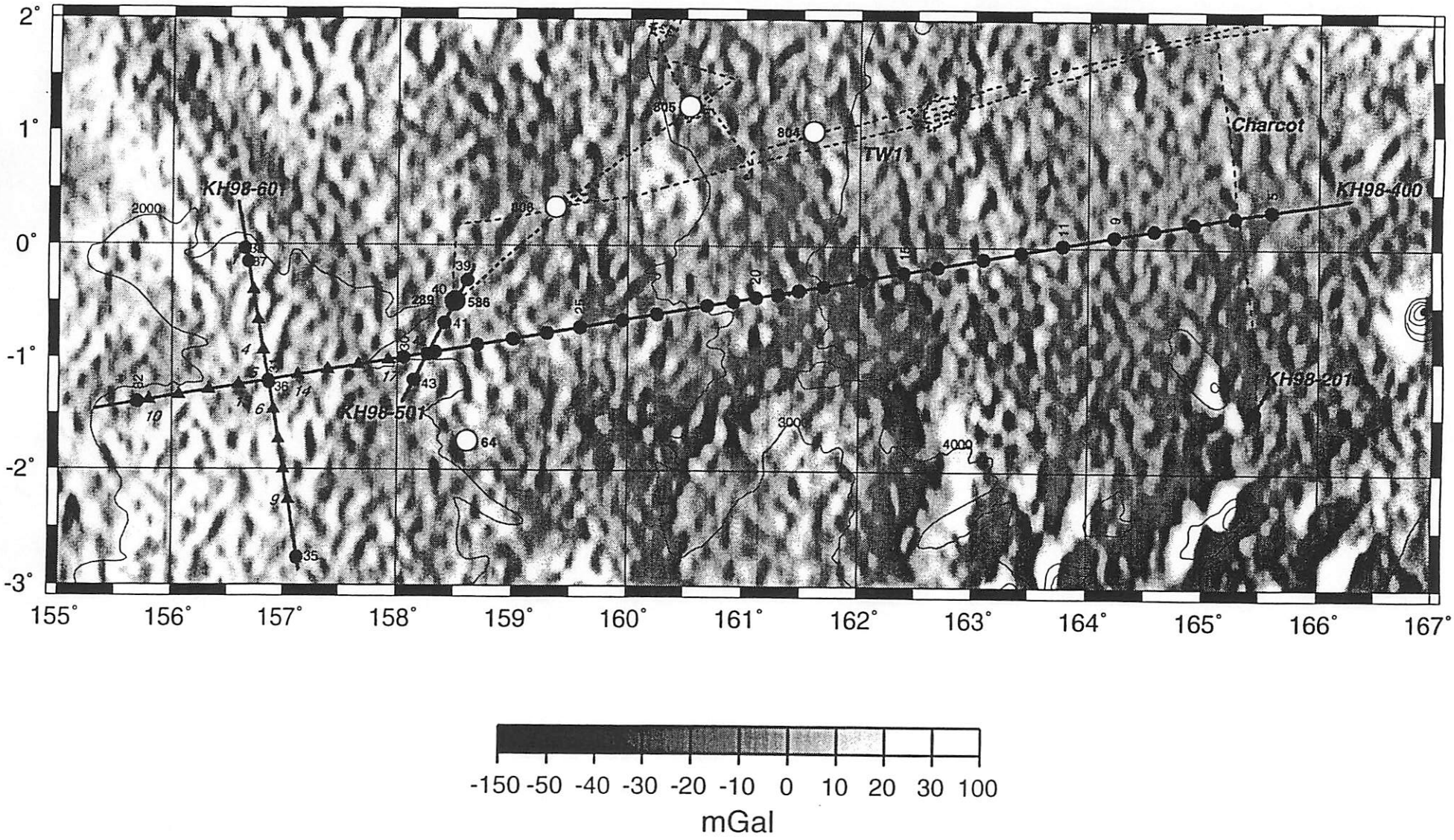
Planned processing and data reduction
Preliminary velocities will be determined from the analog records for profiles in the vicinity of proposed ODP drill site locations.

The digital profiles have been copied from the MCS-tapes to a separate sonobuoy tape. At UTIG, the Ontong Java Plateau and adjacent Nauru Basin profiles will be transformed into travel time-range plots, then reduced and interpreted in conjunction with the interpretation of the MCS profiles. The ODP site survey profiles in the Nauru Basin will be analyzed at the University of North Carolina – Wilmington.

SB #	MCS line\ tape\record # \Julian day	Time Z	Lat. start	Long. start	Water depth, m	Comments
1	201\7\302\45	0659-0700			4442	Hit streamer
2	201\7\350-1023\45	0615-1000	165.451	-1.4575	4442-4430	
3	401\8\-\46					No carrier
4	401\9\1717\46	1009			4367	Hit mag.cable
5	401\9-10\1911-2389\46	1114-1354	165.5891	0.3298	4381-4297	
6	401\10\2432-2983\46	1407-1711	165.2730	0.2731	4396-4388	
7	401\10\3003-3519\46	1718-2010	164.9116	0.2168	4391-4370	
8	401\11\3534-4008\46	2015-2253	164.5683	0.1566	4388-4409	
9	401\11\4063\47	2312-0130	164.2223	0.0950	4413-4457	
10	401\12\4653-4710\47	0228-0246			4459-4460	No audio
11	401\12\4710-5158\47	0247-0516	163.7813	0.0183	4450-4450	
12	401\12\5247-5723\47	0546-0825	163.4150	-0.0475	4454-4465	
13	401\13\5727-\47	0826-1100	163.0895	-0.1053	4465-4457	
14	401\13-14\6301-6731\47	1137-1400	162.6843	-0.1768	4451-4422	
15	401\14\6742-7268\47	1404-1700	162.3865	-0.2298	4422-	
16	401\14\7292-7776\47	1708-1949	162.0196	-0.2948	4383-3960	
17	401\15\7797-8218\47	1956-2216	161.6898	-0.3536	3942-3555	
18	402\15-16\8536-\48	0017-	161.2946	-0.4323	3449-	
19	403\16\9417-9889\48	0510-0748	161.4718	-0.3913	3594-3254	
20	403\17\9967-10258\48	0813-0951	161.1090	-0.4560	3253-3052	
21	403\17\10271-10555\48	0955-1130	160.9130	-0.4911	3043-2930	
22	403\17-18\10625-11135\48	1153-1444	160.6891	-0.5300	2922-2918	
23	403\18\11305-\48	1540-1806	160.2570	-0.6078	2914-2765	
24	403\18\11758-12261\48	1811-2059	159.9570	-0.6603	2765-2532	
25	403\19\12332-\48	2122-2330	159.5781	-0.7273	2489-2441	
26	403\19-20\12767-13210\48	2347-0215	159.2915	-0.7783	2407-2244	
27	403\20\13222-13675\49	0219-0451	158.9951	-0.8305	2245-2161	
28	403\20\13691\14242\49	0455-0800	158.6923	-0.8838	2157-2049	
29	403\20\14255-14604\49	0804-1000	158.3330	-0.9468	2056-2004	
30	403\21\14691-\49	1029-1300	158.0565	-0.9958	2004-1996	
31	404\23\1166-1637\49	2053-2330	156.8546	-1.2033	1848-1902	
32	404\24-25\2965-3524\50	0653-1000	155.6945	-1.3998	2106-2136	
33	-\26\1-\51	0555-			1713-	Guntest
34	501\27\177-\51	1220-				No carrier
35	501\27\187-711\51	1224-1520	157.1295	-2.7645	1711-1663	
36	501\30\3469-4067\52	0641-1000	156.8643	-1.2270	1844-1865	
37	501\32\5679-6061\52	1857-2105	156.6771	-0.1560	2012-2008	
38	501\32\6071-6497\52	2108-2330	156.6453	-0.0363	2010-2081	
39	601\33\230-597\53	1648-1845	158.6026	-0.3127	2192-2225	
40	601\33\607-957\53	1848-2045	158.5040	-0.4993	2220-2146	
41	601\33-34\977-1363\53	2050-2300	158.4060	-0.6900	2141-2068	
42	601\34\1505-1931\53	2347-0210	158.2630	-0.9663	2035-1968	
43	601\34\1946-2324\54	0214-0420	158.1445	-1.1991	1971-1963	

Table 1. Sonobuoy profile parameters.

Fig. 1. Location of sonobuoy profiles (small black circles) recorded during KH98-1 Leg 2 (Table 1). Solid lines show MCS profiles, triangles are OBS locations and large circles mark DSDP/ODP sites.



SB Channel # 26

169.375

Date Local 14/Feb GMT - 14/Feb/98 -

Sonobuoy # 1	MCS Tape # 7	MCS Line # KH98-1 Leg 2 Line 201
Rep. Rate - 20 sec Record 16 sec		# + SIZE GUNS in Water 2 x 20 cu 1 x 17 cu
	BEGIN	END
Record # Shotpoint	302	
Time	6:59:19 Z	7:00
Water Depth	4442	
Latitude	-1 28.41'	
Longitude	165° 26.62'	
Course	CSE 16 HDG 38	
Speed	4.4 - over ground 5.0 - water	

Remarks: Cross MPAC I Shotpoint 906 Southern Nauru Basin

Heading ~41

Current 1.5 kts heading mid-SE

Phone Cut

2 minutes

preamp 0dB

SB Channel # 429

171.625

Date Feb 14 1998 SAT JD45

Sonobuoy # 2	MCS Tape # 7	MCS Line # 202 201 24-ch ~300m
Rep. Rate -	20 sec 16 record	# + SIZE GUNS in Water 2 X 20l 1 X 17l
	BEGIN	END
Record # Shotpoint	350	1023
Time	06:15:20 06:15:20 Z	10:00:00 Z JD45 14-2-98
Water Depth	4442 m	4430 m
Latitude	-1 27.45' S	-1° 13.65' S
Longitude	165 27.06' E	165° 34.43' E
Course	HDG 42.7 CSE 20.4	HDG 51 CSE 31
Speed	4.1 Land 5.3 water	4.0 5.4

JST = 29°C

GUNS NOT Synchronized

Throw 1.4 N.M. from Crossing with MPAC I SR 906

Southern N.B.

08:00 Z - Increase to 1800 PSI

preamp 0dB

Throw from Starboard Gun Rail

Wind Direction 62°

Wind Speed 7 Kts

06:53:00 Z 4-12 sec Analog

Analog Plot C - 14 CHZ

0 - 100 HZ C-8 sec

6:11:42 Z Cross MPAC I

GMT

Date 15/Feb/98 2046

SB Channel # 20
164.875

Sonobuoy # 3	MCS Tape # 8	MCS Line # ~~101~~ 401 48-ch. mcs
Rep. Rate - 20 Sec	Record 16	# + SIZE GUNS IN Water 1 x 20 ~~1 x 17~~
	BEGIN	END
Shotpoint		
Time		
Water Depth		
Latitude		
Longitude		
Course		
Speed		

E-W TRANSECT LINE

Antenna did NOT Deploy
07:20Z NO Record

SB Channel # 16

Date 15 Feb 98 JD 46

Sonobuoy # 4	MCS Tape # 9	MCS Line # ~~403~~ 401
Rep. Rate - 20 sec 16 sec		# + size GUNS in water 1 x 20 1 x 17
	BEGIN	END
Shotpoint	1717	
Time	10:09 Z	
Water Depth	4367	
Latitude	0 21.0' N	
Longitude	165 42.86' E	
Course	CSE 262 HDG 255.5	
Speed	SP - 3.8 - WATER - 7.2 - LAND	

WIND DIRECTION 120°
SPEED 9 Kts

1ST 10 Shots not Recorded? WFM not Set Su Received

Hydrophone Cut ~ 2 min into the mission

preamp 0 dB

SB Channel # 6

Date 15 Feb 98 JD46

Sonobuoy # 5	MCS Tape # 9 + 10	MCS Line # ~~1001~~ 401
Rep. Rate - 20 16sec		# + SIZE GUNS IN Water 1x17L 1x20L
	BEGIN	END
Shotpoint #9 → 1911 — 2203 12:52:05Z #10 → 2204 — Begin 12:53:45Z		2389 TAPE 10
Time	11:13:58 Z	13:53:50 Z
Water Depth	4381 m	4397
Latitude	0° 19.74' N	0° 17.16' N
Longitude	165° 35.35'	165° 17.8'
Course	CSE 262 HDG 255	254 259
Speed	6.6 - LAND 4.0 - water	6.8 4.1

Throw PORT Side

TAPE #9 1911 — 12:52:05 2203

TAPE #10 —

relative wind 120°
Speed - 7kts

Check TAPE 9 - 12:52:05
Begin TAPE 10 - 12:53:4

Analog display gain delayed 500 msec
ie Subtract 500 msec BOT from all values

Guns at 1600 psi

13:47:00

SB Channel # 08

Date 15 Feb 98 JD 46

Sonobuoy # 6	MCS Tape # 10	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN WATER 1 x 200 1 x 130
	BEGIN	END
Shotpoint	2432	2483
Time	14:07:43	17:11:30
Water Depth	4396	4388
Latitude	0° 16.39'	0° 13.11' N
Longitude	165° 16.38' E	164° 55.31 E
Course	HDG 260 GSE 279	HDG 262 ~~GSE 279~~
Speed	7.2 - Land 4.2 water	6.7 3.9

Guns 1600 psi

preamp 0 dB

SB Channel # 22

Date 15 Feb 98 JD 46

Sonobuoy # 7	MCS Tape # 10	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN Water 1 X 17 L 1 X 20 L
	BEGIN	END
Shotpoint	3003	3519
Time	17:18:05 Z	20:10:00
Water Depth	4391	4390
Latitude	0°13.01' N	0° 9.50' N
Longitude	164° 51.7 E	164° 34.77 E
Course	HDG 259.5 SCO 257.6	HDG 261.7 SCO 260.6
Speed	7.9 Land 4.0 Water	6.7 Land 4.1 Water

Begin TAPE 10 17:18:05 END TAPE 10 — 18:58:05

Begin TAPE 11 18:58:40

Guns 1600 psi

preamp 0 dB

SB Channel # 20

Date 15 Feb 98 1046

SSQ-57A Sonobuoy # 8	MCS Tape # 11	MCS Line # 401
Rep. Rate - 20	16 sec	# + size GUNS IN water 1 X 17 L 1 X 20 L
	BEGIN	END
Shotpoint	3534	4008
Time	20:15:15	2253
Water Depth	4388	4409
Latitude	0° 9.40' N	0° 6.12 N
Longitude	164° 3 4.10' E	164 15.61 E
Course	HDG 261.0 SCO 261.1	HDG 257.8 SCO 260.7
Speed	ship 7.3 in water 3.8	SSP 7.5 ESP 4.6

preamp 0 dB

KH-1 leg 2.

Sheet1

SSQ-41A

SB Channel # 13

Date 15 Feb. 98 (JD46) – 16 Feb 98 (JD47)

Sonobuoy # 9	MCS Tape # 11	MCS Line # 401
Rep. Rate – 20 s. Rec 16 s.		# + SIZE GUNS in water
	BEGIN	END 1x 121 1x 20 l
Shotpoint	4063	
Time	2312 Z	~ 0130 Z 16 Feb 98
Water Depth	4413	4457
Latitude	00 05.70 N	0° 2.73' N
Longitude	164 13.34 E	163° 56.35' E
Course	HDG 257.1 SCO 256.9	256.2
Speed	SSP 7.7 ESP 4.7	7.8

PSI 1600

SST 29°C.

preamp 0dB

SB Channel # 23

Date 16-2-98 J047

Sonobuoy # 10	MCS Tape # 12	MCS Line # 401
Rep. Rate -		# + SIZE GUNS IN Water
	BEGIN	END
Shotpoint	4653	4710
Time	2:27:56	02:46:57
Water Depth	4459	4460
Latitude	0° 01.93 N	0° 1.10 N
Longitude	163° 49.2 E	163° 46.8 E
Course	SCO 256.1 4 DG 260.3	—
Speed	Ship 7.9 Wire 4.6	—

strong carrier, no audio ever.
added.

preamp -6dB

Sheet1

SB Channel # 04

Date 16-2-98 JD 47

Sonobuoy # 11	MCS Tape # 12	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN Water 20 C 12 C
	BEGIN	END
Shotpoint	4710 *	5158
Time	02:46:57	05:16:20
Water Depth	4460	4450
Latitude	~~0° 1.10 N~~	-0° 2.22 S
Longitude	163° 46 .5 E ~~163° 5.5 E~~	163° 28.47 E
Course	SOG 260.0 HDG 257.5	261 259
Speed	SSP 8.3 Water 4.6	

preamp -6 dB

Sheet1

SSQ 57A

SB Channel # 26

Date 16-2-98 J047

Sonobuoy # 12	MCS Tape # 12	MCS Line # 401
Rep. Rate	20	# + SIZE 1x 17 l GUNS IN Water 1x 20 l
	BEGIN	END
Shotpoint	5247	5723
Time	054612	082500
Water Depth	4454	4465
Latitude	0°02.85 S	0° 6.29' S
Longitude	163°24.96 E	163° 5.47 'E
Course	Hdg 258.0	Hdg 257.1 Sog 258.1
Speed	7.7	Rel 8.0 Water 4.8

preamp -12 dB

SB Channel # 31

SSQ 57A

Date 16 Feb 98 JD 47

Sonobuoy # 13	MCS Tape # 13	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN Water 17C 20C
	BEGIN	END
Shotpoint	5727	
Time	8:26:36	11:00 Z
Water Depth	4465	4457
Latitude	0° 6.32' S	0° 9.76' S
Longitude	163° 5.57 E	162° 46.02' E
Course	255.8 Geo 257.5 Hdg.	HDG = 260.8
Speed	8.0 kn/l 4.6 water	7.1

1600psi

preamp -12dB

SB Channel # 17

Date 16 Feb 1998 JD 47

Sonobuoy # 14	MCS Tape # 13 + 14	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN WATER 1 x 17 l, 1 x 20 l
	BEGIN	END
Shotpoint	6301	6731
Time	11:37:32	~~13:22~~ 14:00:00
Water Depth	4451	4422
Latitude	0° 10.61' S	0° 13.73' S
Longitude	162° 41.06' E	162° 23.77' E
Course	262 SOG 260.8 HDG	SOG 258 HDG 255
Speed	7.4 - GROUND 4.8 - WATER	6.9 4.6

END MCS TAPE # 13 13:22:00 RECON # 6614

BEGIN MCS Tape # 14 13:23:40 Record # 6620

preamp -12 dB

SB Channel # 30

Date 16-Feb-1998 JD 47

Sonobuoy # 15	MCS Tape # 14	MCS Line # 401
Rep. Rate - 20		# + SIZE GUNS IN Water 1 X 17 L 1 X 20 L
	BEGIN	END
Shotpoint	6742	7268
Time	14:04:31 Z	17:00 Z
Water Depth	4422	
Latitude	0° 13.74' S	0° 17.51' S
Longitude	162° 23.19 E	162° 02.19E
Course	255.8 HDG 273.7 SOG	256.8 HDG
Speed	7.2 - Ground 4.6 - water	7.4 SSP

preamp -12 dB

SB Channel # 15

Date 16 Feb 1998 >D 47

Sonobuoy # 16	MCS Tape # 14	MCS Line # 401
Rep. Rate - 20s		# + SIZE GUNS IN Water 1 x 17L 1 x 20L
	BEGIN	END
Shotpoint	7292	7776
* Time	1708:18 Z	19:49
Water Depth	4383	3960
Latitude	0° 17.695	0° 21.075
Longitude	162° 01.18 E	161° 42.15 E
Course	258.2 HDG	264.9 HDG 260.6 COG
Speed	6.8 SOG 4.8 ESP	8.1 SOG 6.2 ESP

* Reset "WFM" at 17:10 Z
SB Launched at 1708:18 Z

preamp -12dB

SB Channel # 23

Date	16 Feb 1998	1047
Sonobuoy # 17	MCS Tape # 15	MCS Line # 401
Rep. Rate -		# + SIZE GUNS in water
	BEGIN	END
Shotpoint	7797	8218
Time	19:56:17 *	22:16
Water Depth	3942	3555
Latitude	0°21.22'S	0° 24.17' S
Longitude	161° 41.39'E	161° 24.60'E
Course	257.1 SKO 260.7 HGD	257.9 260
Speed	7.5 SSP 5.0 ESP	7.0 4.8

* 2002 reset to WFN, initial 6 minutes not recorded

Profiling up the OSP

Sed. thickening as rise above lysocline

preamp -12dB

SB Channel # 7

Date JD 48 17-2-98

Sonobuoy # 18	MCS Tape # 15 16	MCS Line # ~~402~~ 402
Rep. Rate - 20		# + SIZE GUNS IN Water 2 x 17l 1 x 20l
	BEGIN	END
Shotpoint	8536	
Time	00:17:11	
Water Depth	3449 m	
Latitude	0° 25.94' S	
Longitude	161 17.68° E	
Course	HDG = 81.1 SCO = 79.8	
Speed	SSP = 3.9 - over ground ESP = 5.3	

Starboard Side
Deewned side

Wind Speed 10m
Relative 40°
Direction

preamp -12dB

End TAPE 15 '98 2/17 @ 1:47:

Begin TAPE 16 198 2/17 1:49:0

SB Channel # 17

Date JD 48 17-2-98

Sonobuoy # 19	MCS Tape # #16	MCS Line # 403
Rep. Rate	20	# + size Guns in Water
	BEGIN	END
Shotpoint	9417	9889
Time	05:10:30	7:48:00
Water Depth	3594	3254
Latitude	0°23.48'S	0° 26.81' S
Longitude	161°28.31'E	161° 9.57'E
Course	259.5 SCO 259.2 HDG	261.2 SCO 257.5 HDG
Speed	7.0 SSP 4.4 ESP	7.3 SSP 4.3 ESP

preamp -12dB

SB Channel # ~~19~~ 25

Date 20 48 / 17 Feb ~~98~~

Sonobuoy # 20	MCS Tape # 17	MCS Line # 403
Rep. Rate -		# + SIZE GUNS IN Water 1x20c 2x17c
	BEGIN	END
Shotpoint	9967	~~1015 1100~~ 10258
Time	08:13:51	~~08:58:12~~ 09:51:41
Water Depth	3253	~~3442~~ 3052
Latitude	-0°27.36'S S	~~0°28.51'S~~ 0°29.38'S
Longitude	161°6.54'E	~~161°1.18'E~~ 160°55.22'E
Course	SOG 259.3 HDG 259.9	~~SOG 259.8~~ SOG 26 ~~HDG 257.1~~ HDG 2
Speed	SOG 7.0 ESP 4.4	~~SSP 7.1~~ 6.9 SSP ~~ESP 4.5~~ 4.5 ESP

~~Ash SB system after tow.~~

Switched frequency at ~08:58 to 41 09:00 Z

Killed - cine via topography, check in recording.

preamp -12dB

SB Channel # 19

Date 17-Feb-98 JD 48

Sonobuoy # 21	MCS Tape # 17	MCS Line # 403
Rep. Rate +		# + SIZE GUNS IN Water 2x17L 1x20L
	BEGIN	END
Shotpoint	10271	10555
Time	09:55:27	1130
Water Depth	3043	2930
Latitude	0°29.47'S	0.31.34 S
Longitude	160°54.78E	160 43.90
Course	SCO 259.2 HDG 258.8	
Speed	SSP 7.4 IESP 4.5	

preamp -12dB

SB Channel # 21

Date JD 48 17-2-1998

Sonobuoy # 22	MCS Tape # 17 + 18	MCS Line # 403
Rep. Rate - 20		# + SIZE GUNS IN Water 1X20 2X17 until 1310; then 1x20, 1x17
	BEGIN	END
Shotpoint	10625	11135
Time	11:53:20	14:44.10
Water Depth	2922	2918
Latitude	-0° 31.80 S	0° 35.27 S
Longitude	160° 41.35' E	160° 22.03' E
Course	261.6 SOG 249.8 HDG	261.6 SOG 251.8 HDG
Speed	7.1 SSP 4.3 ESP	7.8 SSP 4.4 ESP

'98 2/17

End TAPE 17 — 13:56:40

Begin TAPE 18 — '98 2/17 13:58:20

preamp -12dB

SB Channel # 4

Date JD48 17-2-1998

Sonobuoy # 23	MCS Tape # 18	MCS Line # 403
Rep. Rate - #18		# + SIZE GUNS IN Water
	BEGIN	END 18062
Shotpoint	1305	
Time	15:40:11	1806:00
Water Depth	914	2765
Latitude	S 0° 36.47'	0° 39.65' S
Longitude	E160° 15.42	159 57.42 E
Course	257.4 SOG	SOG 258.5 HDG 255.5
Speed	7.1 SSP 4.8 ESP	SSP 2.3 ESP 4.9

preamp -12dB

SB Channel # 15

Date JD 48 17-2-98

Sonobuoy # 24	MCS Tape # 18	MCS Line # 403
Rep. Rate +		# + SIZE GUNS IN Water
	BEGIN	END
Shotpoint	11758	12261
Time	18:11:32	20:59:00
Water Depth	2765	2532
Latitude	0° 39.62'S	0° 43.12'S
Longitude	159° 57.42 E	159° 37.44' E
Course	SOG 258.5 HDG 255.5	SOG 259.9 HDG 250.5
Speed	SSP 7.3 ESP 4.9	SSP 6.9 ESP 5.2

preamp -12dB

SB Channel # 2

Date JD 48 17-Feb-98

Sonobuoy # 25	MCS Tape # 19	MCS Line # 403
Rep. Rate		# + SIZE GUNS IN Water 20C 17C x 2
	BEGIN	END
Shotpoint	12332	
Time	21:22:28 Z	23:30
Water Depth	2489 m	2441
Latitude	0° 43.64'S	0° 46.34'S
Longitude	159° 34.64'E	159° 19.52'E
Course	SOG 263.6 HDG 253.8	HDG 257.4
Speed	SOG 6.6 ESM 4.9	7.4 4.6

TUNA
Ship Crossing near buoy 22:30 - 23:00 Z

preamp -12dB

22.35
21.35
2 N.M.

SB Channel # 20

Date JD 48 17-Feb-98 → JD 49 18-Feb 98

Sonobuoy # 26	MCS Tape # 19 + #20	MCS Line # 403
Rep. Rate - 20		# + SIZE GUNS IN WATER 2 x 17 l 1 x 20 l
	BEGIN	END
Shotpoint	12767	13210
Time	JD 48 23:49:21 Z	JD 49 2:15:55 Z
Water Depth	2407 m	2244
Latitude	0° 46.70' S	0° 49.77' S
Longitude	159° 17.49' E	158° 59.99' E
Course	HDG 257.1° SOG 260.2°	HDG - 255.8 SOG 259.6
Speed	SSP 6.7 ESP 4.9	SSP 7.1 ESP 5.0

Preamp -120dB

SB Channel # 24

Date JD 049 18 Feb 98

Sonobuoy # 27	MCS Tape # 20	MCS Line # 403
Rep. Rate - 20		# + SIZE 2 x 17 l GUNS IN Water 1 x 2 l
	BEGIN	END
Shotpoint	13222	13675
Time	021 9:32	04:51
Water Depth	2245	2161
Latitude	0° 49.83 S	0° 52.955
Longitude	~~0° 49.83 S~~ 158° 59.71 E	158° 41.97' E
Course	256° ~~158° 59.71 E~~	261.0 SCO
Speed	7.1 kts	6.6 ESP 4.9 ESP

preamp -12dB

SB Channel # 11

Date	JD 049	18 Feb 98
Sonobuoy # 28	MCS Tape # 20	MCS Line # 403
Rep. Rate -	20	# + SIZE 2 x 17L GUNS IN Water 1 x 2L
	BEGIN	END
Shotpoint	15691	14242
Time	0455 Z	0800
Water Depth	2157	2049
Latitude	0° 53.03'S	0°56.74'S
Longitude	158° 41.54'E	158° 20.45'E
Course	256.6 HDG 260.9 SOG	HDG 264.9 SOG 255.8
Speed	6.5 SSP	SSP 6.4 ESP 6.9

preamp -12dB

SB Channel # 19

Date	18 Feb 1989	JD49
Sonobuoy # 29	MCS Tape # 20	MCS Line # 403
Rep. Rate -	20 1425 -	# + SIZE GUNS IN Water
	BEGIN	END
Shotpoint	1425 -	14604
Time	08:04:07	10:00:00 Z
Water Depth	2056	2004
Latitude	0° 56.81 S	-0° 59.17 S
Longitude	158° 19.9 E	159° 6.70 E
Course	SCO 257.1 Hdg 253 -	250.5
Speed	SSP 7.2 ESP 6.9	7.0 Hdg.

093030Z - odd sound - fishing boat?

Refractions from Sediment + BSMT

preamp -12dB

SB Channel # 09

Date 18 Feb 1998 JD 49

Sonobuoy # 30	MCS Tape # 21	MCS Line # 403
Rep. Rate - 20		# + size Guns in water
	BEGIN	END
Shotpoint	14691	
Time	10:29:08 Z	13:00:00 +
Water Depth	2004 m	1996 m
Latitude	0° 59.75' S	1° 2.87' S
Longitude	158° 3.39' E	157° 45.85' E
Course	SCO 260.9 HDG 250.0	SCO 257.5 HDG 256.5
Speed	SSP 7.1 ESP 4.9	7.1 4.9

Cross 1st ORS ~ 11:40 Z
ORS #17

May still have arrivals beyond 13:00 Z
Still recording beyond 13:00 Z

Preamp -12dB

SB Channel # 18

Date JD 49 18-Feb-98

Sonobuoy # 31	MCS Tape # 28	MCS Line # ~~403~~ 404
Rep. Rate - 20		# + SIZE GUNS IN Water 2 x 17l 1 x 20l
	BEGIN	END
Shotpoint	1166	1637
Time	20:53:15	23:30 Analog off Digital continues
Water Depth	1848	1902
Latitude	1° 12.20'S	- 1° 15.27'S
Longitude	156° 51.285	156° 32.88'E
Course	SCO 261.7 HDG 255.7	SCO 260 HDG 252.9
Speed	SSP 6.7 ESP 4.8	SSP 7.2 ESP 4.6

* Recorded from 1157 on 040.

First CROSS OBS-5

preamp -12dB

SB Channel # 18

Date JD 50 19-Feb-98

Sonobuoy # 32	MCS Tape # 24 + 25	MCS Line # 404
Rep. Rate		# + SIZE GUNS IN water N 20C 2X17C
	BEGIN	END end of line
Shotpoint	2965	3524
Time	06:53:36	10:00:00
Water Depth	2106	2136
Latitude	1° 23.99 S	1° 27.04 S
Longitude	155° 41.67 E	155° 20.02 E
Course	SCO 261.4 HDG 253.2	SCO 259.9 HDG 256.6
Speed	SSP 7.4 ESP 4.7	SSP 6.5 ESP 7.9

Time Record

9:14:29 - 3368 - End tape 24

9:15:10 3369 - Begin tape 25

preamp -12dB

SB Channel # 05

Date JD 51 20-Feb-98

Sonobuoy # 33	MCS Tape # 26	MCS Line # Gun Test Before 501
Rep. Rate - 20		# + size 2 x 20 l Guns in water 1 x 17 l
	BEGIN	END
Shotpoint	1	
Time	05:55:50	
Water Depth	1713	
Latitude	3° 4.96 S	
Longitude	157° 11.74 E	
Course	SCO 354.8 HDG 0.4	
Speed	SSP 5.8 ESP. 5.2	

preamp -12dB

SB Channel # 27

Date JD51 20-Feb-98

Sonobuoy # 34	MCS Tape # 27	MCS Line # 501
Rep. Rate +		# + SIZE GUNS IN Water (2) 1X17l 1X20l
	BEGIN	END
Shotpoint	177	
Time	~ 12:20z	
Water Depth		
Latitude		
Longitude		
Course		
Speed		

NO Carrier

SB Channel # 21

Date JD 51 20-Feb-98

Sonobuoy # 35	MCS Tape # 27	MCS Line # 501
Rep. Rate - 20		# + SIZE (2) 1 X 17 L GUNS IN Water 1 X 20 L
	BEGIN	END
Shotpoint	187	714
Time	12:24:08	15:20:00
Water Depth	1711	1663
Latitude	2° 45.87 S	2° 31.42 S
Longitude	157° 7.77 E	157° 5.27 E
Course	HDG 1.1 SCO 348.4	HDG 4.0 SCO 345.8
Speed	SSP 5.0 ESP 4.7	SSP 4.4 ESP 4.7

17 L & gun off line 12:25

Preamp -12dB

SB Channel # 22

Date JD 52 21-Feb-98

Sonobuoy # 36	MCS Tape # 30	MCS Line # 501
Rep. Rate - 20		# + size (3) 1 x 17 l GUNS in water 2 x 20 l
	BEGIN	END
Shotpoint	3469	4067
Time	06:41:09	10:00:00
Water Depth	1844	1865
Latitude	01° 13.62' S	0° 56.57' S
Longitude	156° 51.26' E	156° 48.69' E
Course	SCO 346.4 HDG 14.5	349
Speed	SSP 5.0 ESP 5.2	5.7

Cross OBS-5

preamp -12dB

SB Channel #

Date 21 Feb 1998 2052

Sonobuoy # 37	MCS Tape # 32	MCS Line # 501
Rep. Rate - 20		# + SIZE GUNS IN Water 2x20 C 1x17 C
	BEGIN	END
Shotpoint	5679	6061
Time	1857.46	21:05:00
Water Depth	2012	2008
Latitude	0° 9.36 'S	0° 1.90 'S
Longitude	156° 40.63 'E	156° 38.72 'E
Course	Sco 350.3 HDG 18.2	Sco 339.0 HDG 14.3
Speed	SSP 5.5 ESP 5.5	SSP 5.5 ESP 5.2

preamp -12dB

SB Channel # 6

Date 21 Feb 1998 JD52

Sonobuoy # 38	MCS Tape # 32	MCS Line # 501
Rep. Rate - 20		# + SIZE GUNS IN WATER
	BEGIN	END 2 x 20 c 1 x 12 c.
Shotpoint	6071	6497
Time	21:08.29	23:30 Z
Water Depth	2010.	2081
Latitude	0°2.185	0° 14.81' N
Longitude	156° 38.22'E	156° 36.39'E
Course	SCO 350.4 HGD 15.3	351 48.5
Speed	SSP 5.8 ESP 5.2	5.1

North of OBS-1

~~Preamp~~

preamp -12 dB

SB Channel # 25

JD
Date 53 — 23 Feb 1998 (LOCAL) — 22 Feb 98 (UTC)

Sonobuoy # 39	MCS Tape # 33	MCS Line # 601
Rep. Rate = 20 s		# + SIZE GUNS IN Water 1 × 17 ? 1 × 20 ?
	BEGIN	END
Shotpoint	230	597
Time	164802	184528
Water Depth	2192	2225
Latitude	check nav -0.312748 ~~-0.335 2908~~	0°29.72 S
Longitude	check nav 158.602637 ~~158.2n725~~	158 30.38 E
Course	202	SCO 200.4 HDG 186.6
Speed	6.0	SSP 6.6 ESP 4.9

SB Channel # 12

Date 1053 22 Feb 98 (UTC) 23 Feb 98 (local)

Sonobuoy # 40	MCS Tape # 33	MCS Line # 601
Rep. Rate -	20s	# + SIZE GUNS IN Water 1x12c 1x20c
	BEGIN	END
Shotpoint	607	957
Time	18.48.37	20:45:00
Water Depth	2220	2146
Latitude	0°29.96'S	0°40.78'S
Longitude	158°30.24'E	158°24.64'E
Course	SCO 205.2 HDG 185.3	SCO 205.3 HDG 182.8
Speed	SSP 6.6 ESP 5.2	SSP 6.3 ESP 5.0

SB Channel # 28

Date JD 53 22 Feb 1998 (UTC) 23 Feb 98 (local)

Sonobuoy # 41	MCS Tape # 33 + 34	MCS Line # 601
Rep. Rate - 20s		# + SIZE GUNS IN Water 2x10 1x17
	BEGIN	END
Shotpoint	977	1363
Time	20:50:51	23:00:00
Water Depth	2141	2068
Latitude	0°41.30 S	0° 53.51' S
Longitude	158 24.36 E	158° 18.12' E
Course	SCO 205.2 HDG 180.3	204 185
Speed	SSP 6.0 ESP 5.1	6.4 5.3

Gold Medal Alaska

North of Line 403 intersection

SB Channel # 07

Date JD 53 22-Feb-98 → JD 54 23-Feb-98

Sonobuoy # 42	MCS Tape # 34	MCS Line # 601
Rep. Rate	20s	# + SIZE GUNS IN Water 2 x 20l 1 x 17l
	BEGIN	END
Shotpoint	1505	1931
Time	23:47:52 Z	0210 Z
Water Depth	2035	1968
Latitude	0° 57.98' S	1° 11.41S
Longitude	158° 15.78' E	158° 8.95' E
Course	HDG 184.3° SCO 206°	HGG 186.7° SCO 209.0
Speed	SSP 6.3 ESP 5.1	6.9 4.9

Intersection with 601 / 403 (SB#29) STARBOARD Side

1 gun leaking Air

SB Channel # 27

Date JD54 23 feb 1998

Sonobuoy # 43	MCS Tape # 34	MCS Line # 601
Rep. Rate -		# + size Guns in water
	BEGIN	END
Shotpoint	1946	2324
Time	02 14 45	0420:29
Water Depth	1971	1963
Latitude	1° 11.95' S	1° 24.30' S
Longitude	158° 08.67' E	158° 02.40' E
Course	205.3	202.8
Speed	6.7 KTS	7.0 kts =